UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/668,844	09/22/2000	Jacek Stachurski	TI-29492	2444

23494 7590 06/07/2005

TEXAS INSTRUMENTS INCORPORATED
P O BOX 655474, M/S 3999
DALLAS, TX 75265

EXAMINER	
LERNER, MARTIN	

ART UNIT	PAPER NUMBER
2654	

DATE MAILED: 06/07/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	**Application No.**	**Applicant(s)**
	09/668,844	STACHURSKI ET AL.
	Examiner	**Art Unit**
	Martin Lerner	2654

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 March 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1 to 7* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1 to 7* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1 and 3 to 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Aguilar et al. ('082)* in view of *Cuperman et al. ("Spectral excitation coding of speech at 2.4 kb/s")*.

Concerning independent claims 1 and 4, *Aguilar et al. ('082)* discloses a hybrid speech encoder, comprising:

"a linear prediction, pitch, and voicing analyzer" – pitch estimation block 110, voicing estimation block 115, LSF to baseband LPC Conversion Block 325 (Figures 1A and 1B); RCELP encoder receives a pitch estimate from harmonic encoder and determines baseband LPC prediction coefficients (column 5, lines 40 to 62; column 7, lines 28 to 42: Figures 4A and 4B);

"a parametric encoder coupled to said analyzer" – harmonic encoder block (Figures 1A and 1B); the hybrid encoder splits the input signal into 2 signal paths; a first path is fed to the harmonic encoder (column 3, lines 10 to 26); a second means for encoding is a parametric encoder, e.g. a harmonic encoder (column 35, lines 15 to 22);

"a waveform encoder coupled to said analyzer" – CELP encoder block (Figure 1A and 1B); the hybrid encoder splits the input signal into 2 signal paths; a second signal is fed to the RCELP encoder (column 3, lines 10 to 26); a first means for encoding is a waveform encoder, e.g. a relaxed CELP encoder (column 35, lines 7 to 14);

"wherein said parametric encoder [encodes] an alignment phase" – GABS control module 422 determines whether a relative time shift should be performed on the current frame (column 10, line 63 to column 11, line 4: Figure 4.2); alignment processor 425 attempts to align the LPC prediction residual with the LPC target vector (column 13, lines 41 to 65: Figure 4.2); the alignment algorithm is set forth in detail (column 15, line 15 to column 18, line 40); an encoding means maintains waveform phase alignment between the encoded output signal from the first means for encoding with the encoded output signal from the second means for encoding (column 34, lines 58 to 62).

Concerning independent claims 1 and 4, the only element omitted by *Aguilar et al. ('082)* is encoding an alignment phase. *Aguilar et al. ('082)* calculates an alignment phase, but does not encode and transmit an alignment phase; instead, subframe parameters from which an alignment phase is calculated are transmitted. (Figures 1A to 2B) However, *Cuperman et al.* teaches a phase dispersion factor, D_{Φ}, is calculated, quantized, and transmitted from an encoder in order to reproduce the excitation signal at a decoder. (Pages 496 to 497: 2. System Overview: Figure 1; Page 499: Table 1) A phase dispersion factor is equivalent to an alignment phase. While transmitting a phase dispersion factor increases an overall bit rate of a transmitted coded signal, *Cuperman et al.* teaches an advantage for a phase dispersion algorithm of a speech codec based

on a sinusoidal (parametric) model of improving the perceived quality resulting in more natural reconstructed speech, and allowing the same model to be used for voiced, unvoiced, and traditional sounds. (Abstract) It would have been obvious to one having ordinary skill in the art to encode an alignment phase as taught by *Cuperman et al.* in the parametric coder of *Aguilar et al. ('082)* for the purpose of improving the perceived quality resulting in more natural reconstructed speech.

Concerning independent claim 3, *Aguilar et al. ('082)* discloses a hybrid speech decoder, comprising:

"a linear prediction synthesizer" – short-term synthesis filter and postfilter 330 receives LPC predictor coefficient array A in RCELP decoder (column 3, lines 43 to 57: Figure 3);

"a parametric decoder coupled to said synthesizer" – hybrid decoder includes a harmonic decoder (column 3, lines 28 to 42; column 38, lines 26 to 32: Figures 2A and 2B); a harmonic decoder is a parametric decoder (column 2, lines 20 to 27);

"wherein said parametric decoder [decodes] an alignment phase" – hybrid decoder comprises a phase synchronize hybrid waveform block 240 and a phase calculate block 245 (column 3, lines 27 to 42: Figures 2A and 2B); phase synchronize hybrid waveform block 240 imports system phase offset BETA of the baseband signal, used to generate the phase response for the voiced harmonics in the harmonic decoder (column 4, lines 3 to 11; column 29, line 46 to column 30, line 38: Figures 2A and 2B,

and 6); a decoder combines reconstructed first and second signals by maintaining waveform phase alignment (column 35, lines 47 to 67).

Concerning independent claim 3, the only element omitted by *Aguilar et al. ('082)* is decoding an alignment phase. *Aguilar et al. ('082)* calculates an alignment phase, but does not decode a transmitted alignment phase; instead, subframe parameters from which alignment phase is calculated are transmitted. (Figures 1A to 2B) However, *Cuperman et al.* teaches a phase dispersion factor, D_Φ, is transmitted to a decoder and decoded as a phase dispersion and prediction factor Φ_k. (Pages 496 to 497: 2. System Overview: Figure 1; Page 499: Table 1) A phase dispersion factor is equivalent to an alignment phase. While transmitting a phase dispersion factor increases an overall bit rate of a transmitted coded signal, *Cuperman et al.* teaches an advantage for a phase dispersion algorithm of a speech codec based on a sinusoidal (parametric) model of improving the perceived quality resulting in more natural reconstructed speech, and allowing the same model to be used for voiced, unvoiced, and traditional sounds. (Abstract) It would have been obvious to one having ordinary skill in the art to decode an alignment phase as taught by *Cuperman et al.* in the parametric decoder of *Aguilar et al. ('082)* for the purpose of improving the perceived quality resulting in more natural reconstructed speech.

Concerning claims 5 to 7, *Aguilar et al. ('082)* discloses a speech encoding/decoding algorithm performed as a program on a processor.

3. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over *Aguilar et al. ('082)* in view of *Cuperman et al. ("Spectral excitation coding of speech at 2.4 kb/s")* as applied to claim 1 above, and further in view of *Thomson*.

Aguilar et al. ('082) does not expressly disclose encoding phase alignment as a difference of an intermediate phase and a phase alignment to codebook waveform phase. However, *Thomson* teaches a related harmonic speech encoding method, where one method of estimating phase involves calculating a phase residual error ε_k. The phase residual may be coded by replacing ε_k with a random vector $\Psi_{c,k}$ selected from a codebook of C codewords. (Column 5, Lines 28 to 39; Column 6, Lines 13 to 29) A parametric phase estimator 235 obtains an estimated phase spectrum $\theta_0(\omega)$, by calculating the phase residual as the difference between the true phase $\theta(\omega_k)$ and the estimated phase $\theta(\omega_k)$. Vector quantization then replaces the phase residual with a random vector $\Psi_{c,k}$ selected from a codebook 243. (Column 10, Lines 24 to 49) Here, the phase residual error ε_k represents "the difference" between the estimated phase spectrum $\theta(\omega_k)$ ("an intermediate phase") and the quantized codebook phase, where the phase residual error ε_k is quantized by a codebook vector ("a phase alignment to codebook waveform phase"). *Thomson* suggests the method of phase alignment is advantageous in harmonic speech encoders to transmit encoded speech at a low bit rate by predicting the phase from previous frames, as the phase remains relatively constant from frame to frame. (Column 3, Lines 40 to 52) It would have been obvious to one having ordinary skill in the art to apply the phase residual error and quantization method of *Thomson* to the phase alignment method of *Aguilar et al. ('082)* for the

purpose of encoding speech at a lower bit rate by predicting the phase from previous frames.

Response to Arguments

4. Applicants' arguments filed 09 March 2005 have been fully considered but they are not persuasive.

Applicants argue that *Cuperman et al.*'s disclosure of a phase dispersion factor is not equivalent to phase alignment. Applicants cite Page 497, Left Column, Lines 23 to 26, and say *Cuperman et al.* does not transmit phase information and synthesizes the phases for the sinusoidal oscillators in the receiver. Applicants state that *Cuperman et al.* discloses the phase dispersion factor controls switching between noise and the synthesized phases as phase sources for oscillators. (Page 497, Left Column, Lines 6 to 9: Figure 2) Applicants maintain that the phase dispersion factor disperses (decorrelates) the various phases synthesized and does not align the synthesized phases in *Cuperman et al.* (Page 497, Right Column, Lines 5 to 12). Thus, Applicants argue that the claims are patentable over *Aguilar et al. ('082)* in view of *Cuperman et al.* This is not persuasive for the following reasons.

Cuperman et al. clearly discloses transmittal of a phase dispersion factor. Applicants' arguments are directed to disclosure referring to the prior art by *Cuperman et al.* Page 497, Left Column, begins by setting forth a discussion of the prior art, where listening tests show unnatural quality if phase information is not transmitted. Thus, if phases are synthesized entirely at the receiver to avoid transmission of phase

information, then listening tests show the predicted phases used to synthesize the residual signal results in a reconstructed speech having a synthetic (unnatural) quality. *Cuperman et al.* says that experiments indicate this undesirable quality is due mainly to overly correlated phase differences between the harmonics. Then, *Cuperman et al.* continues, at Page 497, Right Column, to disclose that instead of allowing for no phase dispersion, excess phase correlation is compensated by decorrelating the phase with a phase dispersion factor, D_{Φ}.

Cuperman et al.'s Figure 1 clearly shows transmission at the encoder of phase dispersion factor D_{Φ}, after extraction from the pitch lag, and transmission to the decoder. Page 496, Right Column, 2. System Overview, states that the phase reconstruction is based on a predictive model that is modified using phase dispersion in order to achieve a more natural synthesized speech quality. *Cuperman et al.* says, at Page 497, Right Column, that D_{Φ} is computed with an algorithm based on the pitch lag. Similarly, Table 1, Page 499, clearly discloses bit allocation for transmission of parameters, where transmitted parameters include a phase dispersion factor with 4 bits at 400 bits per second. *Cuperman et al.*'s phase dispersion factor, D_{Φ}, is equivalent to a phase alignment because it provides for decorrelation of phase between harmonic components. Applicants' claims do not expressly require that an alignment phase corresponds to time-shifting the pulse at the beginning of a pitch period interval to preserve time-synchrony between the input speech and the synthesized speech, as disclosed on Page 19 of the Specification. Although the claims are interpreted in light of

the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Therefore, the rejections of claims 1 and 3 to 7 under 35 U.S.C. §103(a) as being unpatentable over *Aguilar et al. ('082)* in view of *Cuperman et al.*, and of claim 2 under 35 U.S.C. 103(a) as being unpatentable over *Aguilar et al. ('082)* in view of *Cuperman et al.* and further in view of *Thomson*, are proper.

Conclusion

5. **THIS ACTION IS MADE FINAL.** Applicants are reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Martin Lerner whose telephone number is (703) 308-9064. The examiner can normally be reached on 8:30 AM to 6:00 PM Monday to Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richemond Dorvil can be reached on (703) 305-9645. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

ML
5/23/05

Martin Lerner
Martin Lerner
Examiner
Group Art Unit 2654